INSTRUCTION MANUAL

For operation of

OAKWOOD SERIES 6 F/2/3 & 6E/2/3
HYDRAULICALLY OPERATED
PVC LAMINATOR

LETCHWORTH
OCT 1991

INDEX

1. INTRODUCTION

The Oakwood Identity Card Table Top Laminators are designed basically to laminate P.V.C., polyester/polyethelene or polycarbonate identity cards, including sophisticated cards with various types of machine readable inserts such as copper, ferrite, aluminim disc and wire resistance code sheets, externally the cards can be manufactured with photographs, magnetic stripes and bar codes. Combine some of these components with customised printed core and overlay materials and your Oakwood Laminator can produce a very high level security card.

Other processes which require controlled amounts of heat, pressure and time can also be included within the existing machine parameters.

The machine consists of hydraulically operated electrically heated platens which close and apply controlled amounts of heat and pressure onto the material to be laminated, at present intervals, the machine will automatically remove the heat, adjust the pressure, cool the material using water and forced air and open to allow the operator to remove the laminated cards.

At the start and end of each cycle water is flushed from the system automatically on a time controlled cycle to maintain the shortest possible heating times and even platen temperatures.

2. SERVICES AND EQUIPMENT

2.1 ELECTRICAL SUPPLY

The Series 6E/F will require a threephase electricity supply of :

415 volts, 50 Hz, 45 Amps per phase.

The machine as supplied, is wired for a 4 wire system, (3 live and 1 earth), See FIG 1, however, in order to connect to a 5 wire system which has a separate neutral, See FIG 2, proceed as follows :

Open the rear electrical junction box and remove the earth neutral link on the terminal block.

ELECTRICAL INSTALLATION

It is important that the hydraulic pump motor rotation is correct. This is dependant upon the 3 phase connections to the machine. If the phase connections are incorrect the pump motor will rotate in the wrong direction and the press will not close. To correct, simply change over any two of the three live wire connections at the supply, (do not change wiring inside the machine). To check connections, switch on power to machine and check rotational direction of hydraulic motor as indicated by the black arrow on the motor guard.

AIR SUPPLY

A standard clean air supply of 80 psi at a minimum of 3CF/min should be connected to the rear of the machine. Adjustment of the pressure regulator should be made to give a working pressure of 50 psi.

The air supply is only required for 20-30 seconds per machine cycle, smaller size compressors can be used with a suitable reservoir.

2.2 COOLING WATER SUPPLY INSTALLATION

The water supply should be at 40 psi (2.2 bar) pressure with a flow of 15 - 20 litres per minute, cooled to a maximum of 10 degrees C. Connect the blue water inlet hose to the machine base at the right hand side and connect the remaining flexible hose to the copper outlet connection at the rear of the machine and to a suitable drainage point.

2.3 LAMINATING TRAYS

Trays are provided with your laminator to enable card make up and loading of subsequent trays whilst the first is in the process of lamination. These trays can be supplied with pin location to suit your individual requirements.

2.4 LAMINATING PLATES

In order to achieve good long term quality card, it is important to take care to prevent scratching of these laminating plates. Cleaning the plates regularly with Johnsons "Sparkle" polish will ensure best results.

2.5 CUSHIONING PAPER

The special paper is used on the bottom of the laminating trays and over the assembled PVC materials and laminating plates, to give a uniform thickness of sandwich in the laminating process.

2.6 HYDRAULIC OIL AND TANK CAPACITY

Fill oil reservoir with Tulus 37 or equivalent oil until level is at the maximum position in sight window on the left hand side of the machine.

3.0 MACHINE CONTROLS

Machine controls are located on the front face of the laminator - no other operation adjustable controls are contained with the machine. However, at the start of each day, prior to operation, the cooling system needs any excess air to be bled out. See section 3.4 for this.

CONTROLS :

1. Mains isolator - ON/OFF switch.
2. Mains supply phase indicators.
3. Heater overload circuit breakers.
4. Cooling fan overload circuit breakers.
5. Hydraulic pump motor reset indicator (motor reset housed inside panel).
6. Cycle start and reset buttons.
7. Machine function selector switch.
8. Process setting controls, (located behind facia cover).
9. Process setting display module.
10. Cycle sequence indicator (LED).
11. Tray safety switches.

3.1 ELECTRICAL PROTECTION CONTROL

The electrical circuit protection is designed to protect the main drive motor, cooling fan motor, platen drive motor and heater circuits.

3.1A Fan motor : if the fan motor circuit breaker should open the electrical supply to the fan will be removed.

Allow the fan to cool, reset the control and the fan should be reactivated, if the circuit breaker opens continuously or will not reactivate the motor when pressed a major fault has occurred and assistance should be obtained from a qualified electrician.

3.1B Hydraulic Motor : if the motor overload indicator is illuminated the supply to the motor has been removed.

To reset, remove screws and slide out lower tray housing electrical components, locate motor reset and press in to reset.

3.2 PROCESS CYCLE ADJUSTMENT

- Switch on power.
- Check all phase indicators are illuminated.

To adjust machine function settings :-

- Rotate machine function selector switch to the correct function setting to be adjusted.
- Read value on display.
- Open cover on front facia and adjust appropriate control until the required value appears on the display.
- When the desired reading has been obtained move function selector switch to next position of adjustment or reset onto laminating temperature position. (This is an optional position used when the machine is in process cycle so that the operator can visually monitor the machine performance if required).

3.3 ADJUSTABLE FUNCTIONAL CONTROLS

As can be seen from the front facia there are six adjustable controls for use when setting the machine. P.V.C. materials used in the construction of cards require heat and pressure to give a secure bonded structure.

The following sections will show the relationship of each function within the production process.

3.3A LOW PRESSURE (LO PRESS) - 0 - 199 x 10 psi

Low pressure is applied to the material during the heating stage to achieve lamination. Actual lamination will take place when the material has reached a molten stage at very low pressures. If the low pressure applied is too high distortion will take place.

3.3B LAMINATING TEMPERATURE 90 - 200 DEGREES C

The heat lamp illuminates when heating is taking place. This setting is adjusted to the minimum temperature that will bond all layers of material.

3.3C HOLD

This is a time for heat to penetrate the pack giving the same effect to the material within the centre, as the outside. Hold lamp illuminates after additional external timer has timed out.

3.3D COOLING 50 - 160 DEGREES C

Following the hold time the machine begins its cooling of the product. This setting is the temperature at which the machine moves to the high pressure setting.

3.3E HIGH PRESSURE (HI PRESS) 0 - 199 x 10 psi

The high pressure setting represents the pressure applied to the material at the cooling temperature switch point.

3.3F M/C OPEN 0 - 60 DEGREES C

This setting is in degrees C and indicates the temperature of the pack when the machine will finish the cycle. This is adjusted to allow for safe handling of the product and for the material to have cooled to a stable condition.

3.4 STARTING THE LAMINATION CYCLE

IMPORTANT

At the start of each day, prior to operation, bleed the air out of the cooling system. This is done by releasing the air bleed screw on the back of the chiler.

After a tray has been loaded with material and the machine controls set the tray can be placed into the machine.

The tray should be pushed fully home onto the stop where the tray home limit switch will be automatically activated.

3.5 SAFETY FEATURES

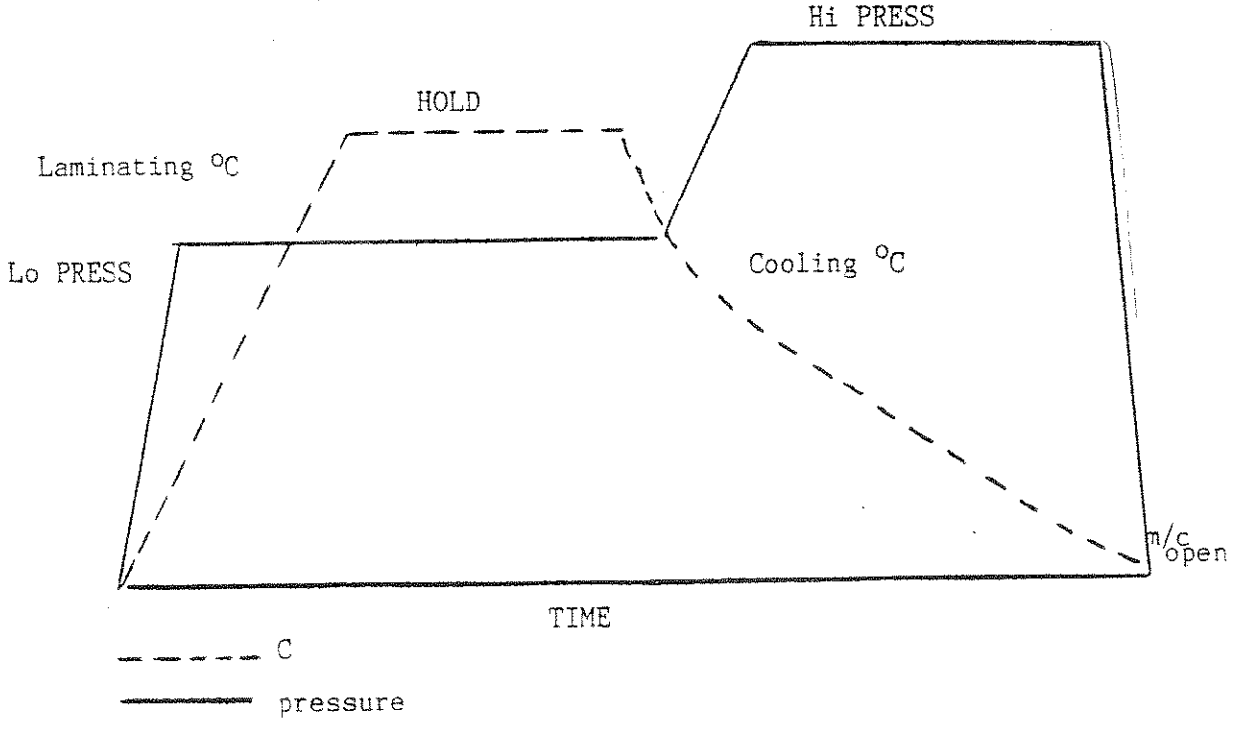
Personal safety is vital with the operation of all machines.

A number of features have been built into the laminator to ensure operator safety.

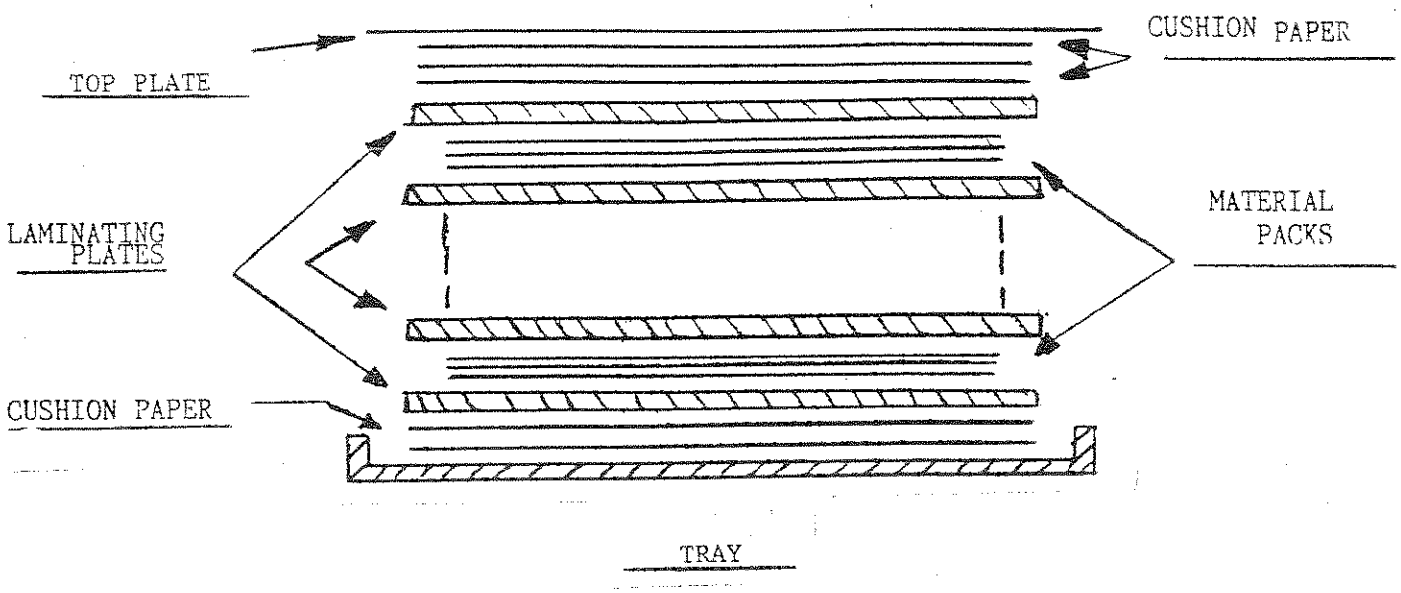
A machine reset button is located on the front panel.

If at any time the mains power to the laminator fails, on re-applying power, the machine will reset automatically and the platens will open. To restart the cycle, operate the cycle start button.

TEMPERATURE AND PRESSURE DIAGRAM



4.0 SETTING AND RUNNING



4.1 SETTING THE LAMINATION PROCESS

The method used to laminate material is to apply heat at very low pressure until all levels of material become molten and fuse together. At this state the material is cooled to a plastic state where high pressure is applied to obtain perfect lamination and a good surface finish without causing any print distortion.

A final cooling process is then applied 'cooling' the material to its thermal set condition when it can be trimmed or punched to the required size.

Adequate knowledge of the material temperature ranges is very important when making cards in order to prevent material miss match from taking place.

4.2 LOW PRESSURE

The low pressure stage of the lamination process must hold the molten material. The level of pressure required will vary according to the type of material being used and the complexity of the card make up being laminated.

Too much low pressure will distort the molten material giving the cards a barrelled shape and moving all straight printed lines outwards

Insufficient low pressure will allow the molten material to contract moving in at the edges.

A primary setting of the low pressure can be made but the correct pressure will be ascertained by visually checking the laminated cards for distortion and readjusting as necessary.

To set the low pressure proceed as follows :-

A) Load tray with material of the specified thickness into the Laminator.

B) Rotate machine function selection switch to LO PRESS function.

C) Adjust the corresponding control until a reading of 40 is shown on the display

D) Run machine through cycle and inspect results. Increase low pressure to produce perfect results.

4.3 LAMINATION TEMPERATURE

The Lamination temperature is the temperature at which the machine must be set to melt the material so that fusion can take place.

Different materials flow at different temperatures and these temperatures can vary from 110 - 185 degrees C.

Before lamination of any materials it is advisable to ascertain the vicat point of that material from the supplies as lamination at incorrect temperature can produce cards that may look perfect but are not fused together correctly resulting in a very brittle card with a short life span

To set the lamination temperature proceed as follows :-

a) Rotate the machine function selector switch to LAMINATION TEMP.

b) Adjust the corresponding control until the required reading is displayed.

Again this only a primary setting further readjustment may be necessary to produce the correct results.

4.4 HOLD TIME FOR HEAT PENETRATION

The hold time is set to allow heat to penetrate into the centre of the stack during the lamination process.

The correct hold time is determined by inspecting the laminated cards for quality. If materials in the middle of the stack of PVC can be separated at the edges, an increase in hold time may be required to give greater heat penetration. This could also be achieved by a reduction in the amount of cushion paper used combined with adjustment to the hold time.

To set the hold time proceed as follows :-

A) Switch to 'hold' on front panel and adjust appropriate control to show a time of not less than 10 seconds.

Further readjustment of 'hold' time may be necessary.

4.5 COOLING TEMPERATURE

The cooling temperature is the temperature at which the laminated materials must be cooled to, before applying high pressure, (the plastic state).

This setting is made in conjunction with adjustments to cooling water flow and water temperature.

Eg. If a large volume of very cold water is passed through the platens, the platens will become chilled very quickly and switch the laminator into high pressure before the material has dissipated most of its temperature, causing distortion to take place.

A controlled flow of water at a known temperature should be used to achieve the desired cooling effect. Water flow control valves have been located at the rear of the machine to control and balance the flow of water to each platen. Fine adjustments should be made using these controls during the set up process of the laminator.

4.6 TO SET COOLING FLOW

See Appendix B

To set cooling temperature proceed as follows :-

A) Rotate the function selection switch to COOLING TEMP OC.

B) Adjust the corresponding control until the required reading is displayed.

4.6 HIGH PRESSURE

High pressure is applied after the materials being laminated are cooled to the plastic state.

The high pressure stage ensures that perfect lamination takes place and also assists the visual appearance of the card surface.

Two higher high pressure settings can distort the material.

A low high pressure setting can result in a product not correctly laminated or cause surface defects.

To set the High pressure proceed as follows :-

a) Rotate the function selector switch to 'HI PRESS'.

b) Adjust the corresponding control until the required setting is displayed.

Further adjustment to this setting may be necessary to produce perfect results.

4.7 MACHINE OPEN TEMPERATURE

The machine open Temperature is the temperature at which the platens open and allow the laminated material to be removed.

This temperature is usually set to a level high enough to give a quick time cycle, yet low enough for safe handling and a good quality product. Too higher machine open temperature can cause surface defects of the finished product.

A machine open temperature set very low will increase the machine cycle time whilst serving no useful purpose. To set the machine open temp. proceed as follows :

a) Rotate the function selector switch to COOL TEMP.

b) Adjust the corresponding control until the required reading is displayed.

4.8 CUSHION PAPER (HEAT PENETRATION)

As can bee seen in section 4 cushion papers are placed above and below the lamination plates.

The papers are made of a special material and play a major part in the lamination process.

The cushion papers perform two functions :-

A) They slow down (cushion) the heat penetration into the top and base cards allowing for a steady heat increase into the material pack.

B) Remove slight imperfection in machine or polished surfaces of lamination plates.

Varying the number of cushion papers can result in surface imperfections on the finished cards, distortion due to increased heat penetration, or dull surface finish and poor lamination due to poor heat penetration.

Any change in the number of cushion papers used during the lamination process will also require appropriate changes to the lamination and cooling temperatures, hold time and high and low pressure. settings.

The cushion papers become compressed during use and should be changed as soon as the surfaces become smooth or discoloured.

5.0 PRODUCT PROBLEMS AND PRODUCT FAULT ANALYSIS

When setting the laminator or investigating production problems always mark the cards removed from the laminator for identification purposes.

Record all machine settings before making any adjustments for reference use.

Replace cushion papers and check condition of lamination plates, tray and platen surfaces for foreign matter.

Because of the nature of the Lamination process it must be understood that all aspects of the process are inter-related.

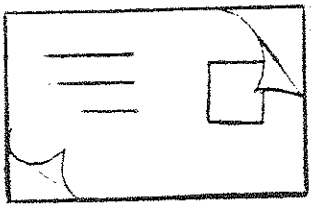
For example :-
Changing the number of the cushion papers will change the heat penetration, and high and low pressures applied to the material.

- A reduction in the cooling temperature may allow an increase in high pressure.

- Increasing the lamination temperature may require a reduction in low pressure and possibly a reduction in the hold time.

Set out below are some helpful tips when fault finding on product problems.

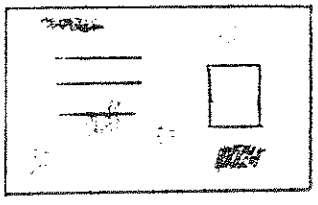
PROBLEM	SOLUTION
5.1. Cores or overlay can be separated after lamination	1. A - Increase Laminating temperature B - Slight increase to cooling. C - Possible increase to high pressure.



PROBLEM

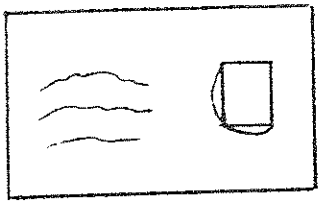
SOLUTION

5.2. Dull patches and pitting.



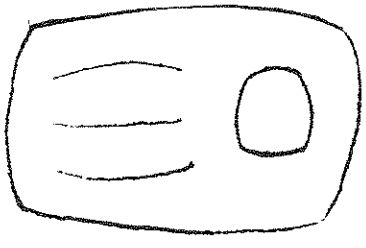
2. A - Increase cooling temperature and high pressure.
   B - Slight increase to laminating temperature.

5.3. Distortion on printing and around photo.



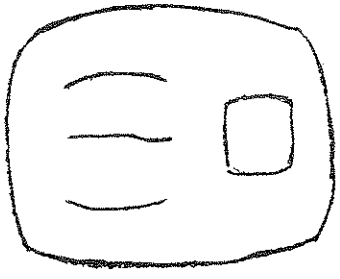
3. A - Reduce cooling & lamination temp.
   B - Check photos are off-set in stack.
   C - Check thickness of photos for pressure build-up.
   D - Check low pressure.

5.4 A - All cards barrelled.



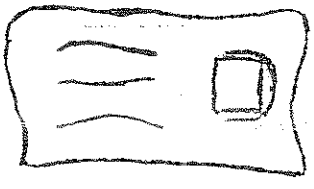
4. A - Reduce lamenting temperatures & cooling temperature.
   B - Check low pressure setting.
   C - Check high pressure settings.

B - Cards 1 and 5 only.



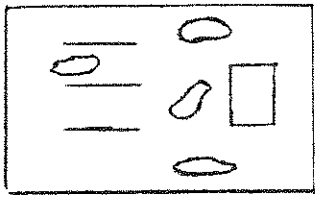
B - Add extra cushioning papers, re-adjust pressures, a slight increase to hold time may be necessary.

5.5. Shrinkage around edges of card and photo.



5. A - Increase low pressure.
B - Check card make for foreign matter or distorted plates.

5.6 Watermarks or puddling on card surface.



6. A - Increase pressure.
B - Reduce machine open temperature.

6.0 MACHINE FAULT FINDINGS

PROBLEM	POSSIBLE SOLUTION
Start button pressed platens do not move.	- Power to machine is OFF - No tray in machine. - Tray home switch not activated. - Motor switched OFF on PCB. - Fault in try home switch circuit connection 18-19 on PCB. - Motor relay not energised. - Fault on PCB - Check motor circuit breaker.
Platen close heat light comes on, heat does not increase.	- Check circuit breakers. - Check output from PCB terminal 12-13. - Check function of heater relay. - Check Thermal cutouts. - Check heater resistance.
Platen close heat light does not come on.	- Fault on PCB.

PROBLEM	POSSIBLE SOLUTION
Heaters are activated heat increases but machine does not switch into hold cycle.	- Check possible faulty thermocouple installation. - Check thermocouple voltage on PCB. - Check platen temperature cut outs/replace. - Check heater resistance.
Cooling fan is not activated, cooling fan indicator on front facia is illuminated.	- Check cooling fan circuit breaker is pressed in. - Check circuit breaker function. - Check power is at motor terminals. - Check motor. - Fault on PCB.
Cooling fan is not activated after hold cycle - indicator is not on.	- Fault on PCB.

7.0 MAINTENANCE REQUIREMENT AND TECHNICAL INFORMATION

7.1 If the machine is in constant daily use the following points should be attended to.

ON A DAILY BASIS

- Check lamination plates for damage, scratching or deformation.
- Replace one sheet of cushion paper above and below the product each cycle, (or to your requirements).
- Check condition of tray surfaces.
- Check condition of plates for foreign matter.
- Bleed air out of cooling cyctem. See section 3.4 for details of this.

ON A MONTHLY BASIS

- Lubricate lower platen pillars bushes with silicon grease.
- Check heater resistance.
- Check hydraulic oil level.

7.3 LAMINATOR CONTROL MODULE (PCB)

LAMINATOR CONTROL MODULE (HYD)

CIRCUIT DESCRIPTION

1. Power Supply

The mains input to the transformer is via a 500mA quick blow fuse and transient suppressor. Links are available on the PCB to select 240V or 120V A.C. nominal. Note that an electrical earth is required to make full use of the suppressor.

Three voltage rails are required by the control system :

1. Relays and l.e.d. indicators - unregulated +16V nominal.
2. L.c.d. display and thermocouple amplifier - -5V regulated +/- 1V.
3. All remaining circuitry - +5V regulated +/- -.3V, 1% stability.

The +16V supply is taken as the smoothed output from the bridge rectifier.

An inverted voltage doubler is used to generate a negative supply which is then regulated by a zener diode circuit. A three terminal regulator is used to obtain the stabilized +5V supply.

2. Thermocouple amplifier + Temperature Control.

Cold junction compensation is achieved by feeding part of the forward voltage of D2 (which senses the ambient at the thermocouple cold junction) into IC 1. IC1 increases the compensated couple voltage to a level that can be used to display the platen temperature and as an input to the temperature control section. Presets are available for two point calibration. Note that these units are specifically calibrated to compensate for the differences between laminating temperature and actual platen temperature. R3 ensures that should the thermocouple go open circuit, (ie. broken wires or burnt out couple) the controller will turn off the supply to the heaters. C1 + C22 reduce mains hum present on the thermocouple leads.

I.C.3 compares the output from I.C.1 to the value set VR102. The output on pin 1 will be high if the amplified couple voltage is below that of VR102, and will turn TR7 on. TR6 prevents the heater relay from energising if the module is not in cycle, pressure 1 (P1) has not been reached, or the timer has not timed out. Should TR6 be on, the heater relay will be on and LP102 lit. D48 and C26 protect the circuit against the back e.m.f. generated by the relay as it turns off. R15 reduces the supply to a value suitable for the relay.

T1 and T2 are sensed by individual comparators, one input of each is taken from the temperature set potentiometers (T1 + T2) the other input of each from the output of the thermocouple amplifier. The outputs from the comparators are used within the control logic.

3. Fan

A high output from the control logic will turn TR5 on so energising the fan relay (RLY 3). The cool l.e.d. will also illuminate.

Note that the production units do not have D26 fitted and consequently if the cycle is terminated by RESET with the platens hot, the machine will reset without cooling the platens. The platens will therefore take some time to cool and may increase the internal temperature of the enclosure to a level which is unacceptable to the control module.

4. Pressure Sensing

The pack pressure is sensed indirectly via a multiturn potentiometer mounted on the output shaft of the platen motor gearbox. The pot should be mechanically adjusted (with the motor disabled) so that in the reset state, the reverse relay just drops out. The pot can then be clamped to the output shaft with the cam in its reset position. The maximum mechanical rotation can be set by the LIMIT preset.

The settings of P1, P2 and LIMIT are sensed by three comparators. Each compares the position sensed by VR200 to that set on the associated set pot. The outputs are then used in the control logic.

5. Start / Stop

The machine cycle is initiated by the START switch only if the card drawer is closed and the machine is not already in cycle.

RESET may be operated at any time. If the machine is at its reset position and not in cycle, nothing will happen, but at any other time the cycle will be terminated, and the platen motor reverses to the reset position. (Note that while the RESET button is pushed the motor will not run. This is for motor protection purposes - see Motor Control).

The START / STOP function is achieved by using a flip-flop circuits made up of two gates of I.C.5. C3 ensures that should START and RESET be pressed at the same time, reset will be given priority. C28 suppresses transients and hum on the switch wiring. R38 + R39 allow C3 to discharge.

One of three conditions can cause a reset :

i) Operating the RESET button (via D9)
ii) End of Cycle (via D8)
iii) Mains power application (via D10)

End of cycle is assumed if the output of the LIMIT comparator goes low. This signal is inverted (I.C. 6 pins 5+6) and fed to D8 through C11. C11 automatically removes the reset after a short period to allow the cycle to be repeated.

Application of mains power causes 5V to briefly appear across R44, causing a reset via D10. D29 allows C9 to discharge quickly when the mains power is turned off. R40, R41, D4-7 are to protect the C-MOS gates against input transients.

6. Hold Timer

Two flip/flops are used to control the hold timer. One of these is used to start the timer and also drives the 'HOLD' lamp, and the other to rest the timer at the end of the set period.

Whilst reset, the lamp is off and TR1 is turned on, placing a low resistance across the timing capacitors. Both flip/flops are in their reset state. When the control logic initiates the timer, the start flip/flop is set (IC7 pins 8-13), removing the low resistance across the capacitors. C2 now charges at a fixed rate. In order to linearise the timer, the charging current is made constant by TR8, R13+VR4. A comparator monitor the voltage on C2 and compares it against the voltage set by the HOLD set pot (VR101).

When C2 voltage is just above VR101 voltage, the comparator output will go high, setting the reset flip/flop. This will reset the start flip/flop, which then turns TR1 on to discharge C2. The reset flip/flop also starts the fan via D24. At the end of the lamination cycle the reset flip/flop is reset when the output of the limit comparator goes low.

SYSTEM CALIBRATION

Equipment required :

Millivolt source.
D.V.M.
Stopwatch.

Procedure

1. Ensure that the mains supply is turned off whilst making connections to the unit. Beware of the live tracks on the p.c.b. whilst making adjustments.

2. Check that the motor OFF/RUN switch, located on the rear of the main p.c.b. is set to the RUN position.

3. Connect the mains supply and then turn pot to the board and link the guard switch terminals.

4. Turn the mains power on and selecting each position on the rotary selection switch ensure that the set pots VR101-VR106 all work correctly for their relevant switch positions.

5. With the unit turned off connect the millivolt source to the thermocouple input on the main board observing the polarity of the input. Set the millivolt source to give an output of 8.12mV (check using d.v.m.) turn millivolt source off and short output terminals to give an absolute zero voltage input to the board.

   Turn the module on and select the laminating temperature position on the rotary selection switch. Operate the start button to put the unit into cycle and adjust the zero pot (VR1) for a reading of 000.0 +/- 0.2 on the display.

   Remove the short from the millivolt source and turn on -set the span pot (VR2) to give a reading 150.0 +/- 0.2 on the display. Now turn the millivolt source off and short the terminals again - checking that the display returns to zero. Repeat this test until satisfactory readings of 000.0 and 150.0 are achieved for the two input states.

6. With the millivolt source turned off and shorted now adjust the zero pot (VR1) for a reading of 020.0 (ambient). Remove the short and turn the millivolt source on, a reading of 167.0 - 171.0 should be displayed. Turn the millivolt source off and re-short its output.

7. Select the hold time position on the rotary selection switch and adjust the set pot (VR1010) to give a reading of 120.0 on the display, and turn the temperature pot (VR102) fully anticlockwise.

Now operate the start button to put the controller into sequence - the motor power relay should operate, commanding the motor to drive forward. Rotate the position pot in the forward direction until the motor power relay drops out and the heat lamp comes on.

At this stage remove the short from the millivolt source and turn it on - the hold lamp will come on and the display will begin to decrement. As soon as the hold lamp comes on a stopwatch should be started to check the calibration of the timer.

If the timer is incorrectly calibrated it can be adjusted by means of the TIME preset (VR4). Turning the preset clockwise will increase the time delay, anticlockwise will decrease the time delay. The timer should be calibrated to +/- 2 seconds when set to 120.0 second delay. Once the hold timer is calibrated the system should be 'dry run' through a complete sequence, and providing this is successful the system can be considered calibrated and ready for use.

8. a) Remove security tape from pressure amplifier with machine on and platens open. Adjust RV2 to give a millivolt reading across terminals 17 and 18 of -40mv.

b) With fully loaded trays in position put machine into cycle and set low pressure to 100. Monitor millivolt reading on terminals 17 & 18 and adjust RV1 to obtain 1,000 mv.

Repeat a) and b) as required to give satisfactory readings.

8. DRAWINGS AND DIAGRAMS

ELECTRICAL CONNECTION DETAILS

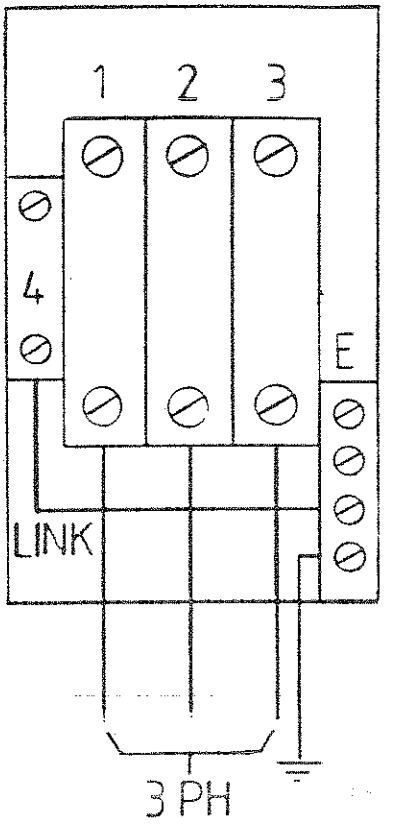
Machines supplied requiring a 3 Phase electricity supply can be connected to a 4 wire system (3 live and 1 earth), see FIG. 1. However in order to connect to a 5 wire system which has a separate neutral, see FIG. 2, disconnect the earth to neutral link.

3PH 4 WIRE CONNECTIONS

FIG 1

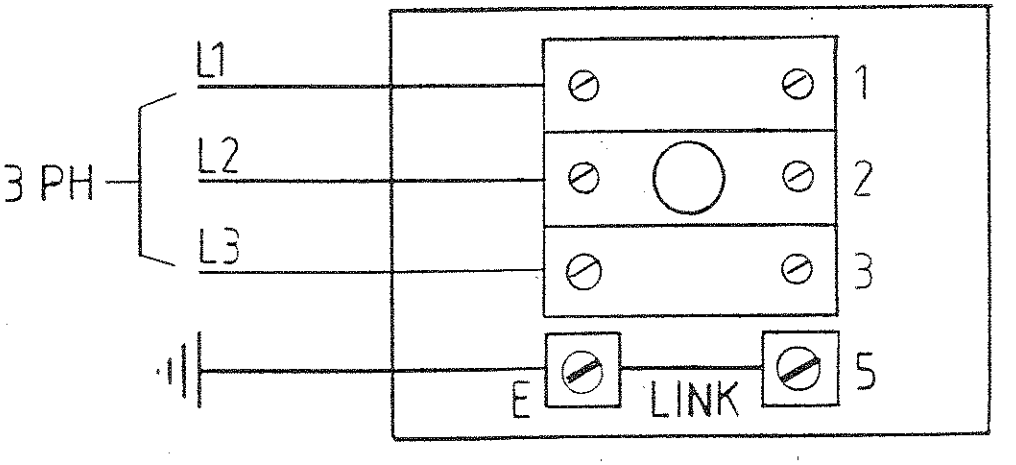
(LINK FITTED)

M C'N ISOLATOR



GUILLOTINE
HOLOGRAM
SIG PANEL
PUNCH PRESS
INSPECTION

M C'N ISOLATOR



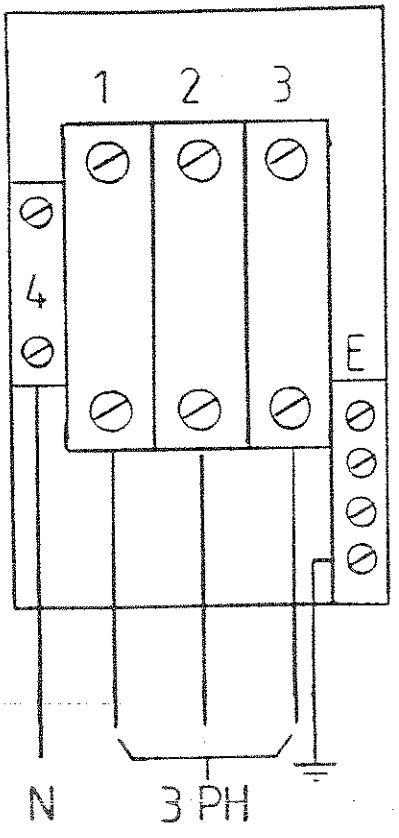
6 E/F LAMINATORS

3PH 3 WIRE CONNECTIONS

FIG 2

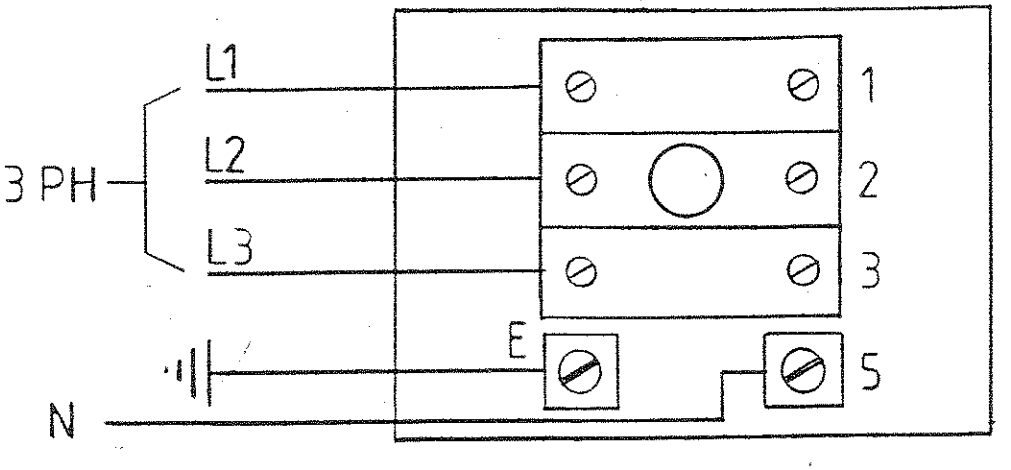
(NO LINK)

MC'N ISOLATOR

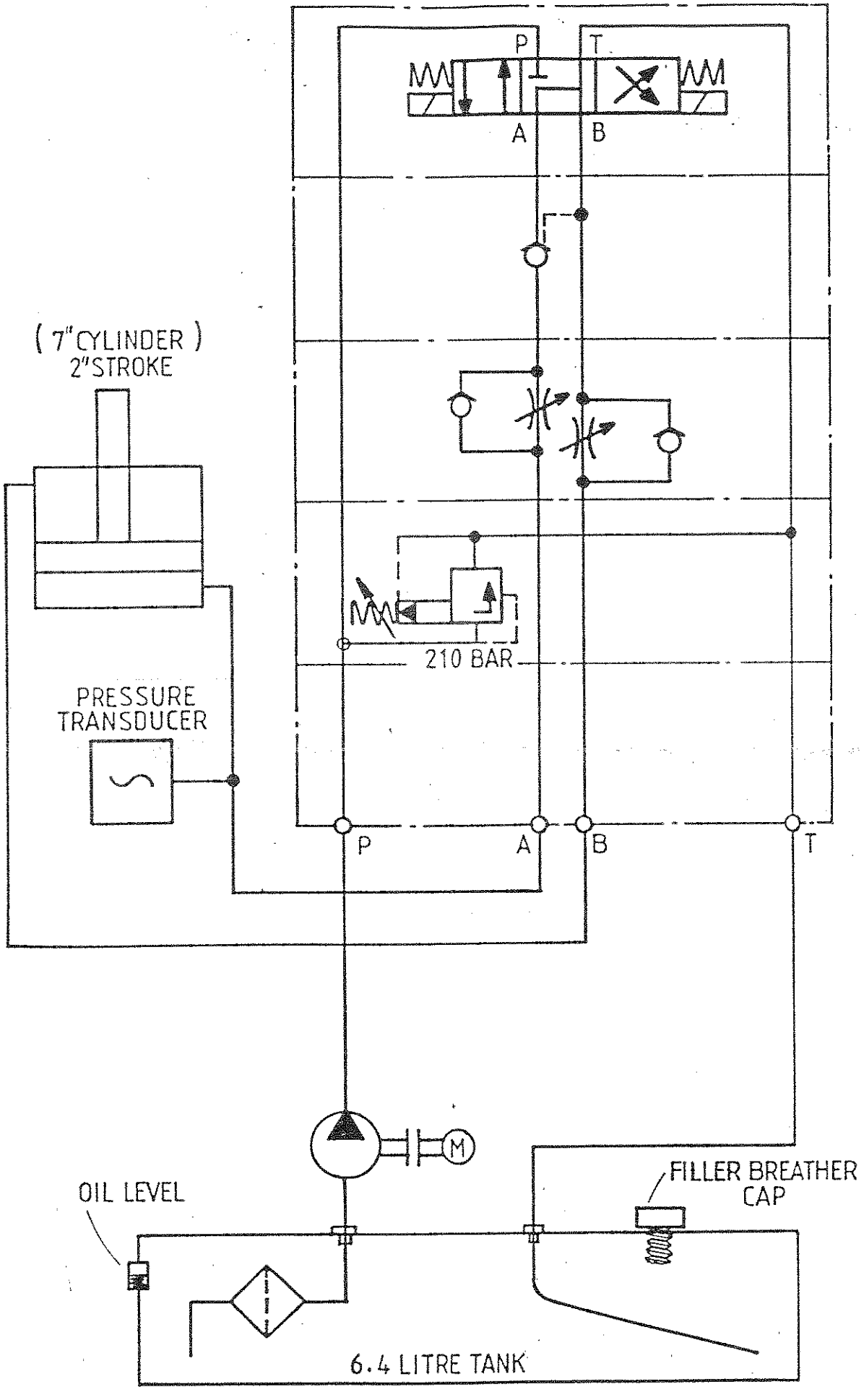


GUILLOTINE
HOLOGRAM
SIG PANEL
PUNCH PRESS
INSPECTION

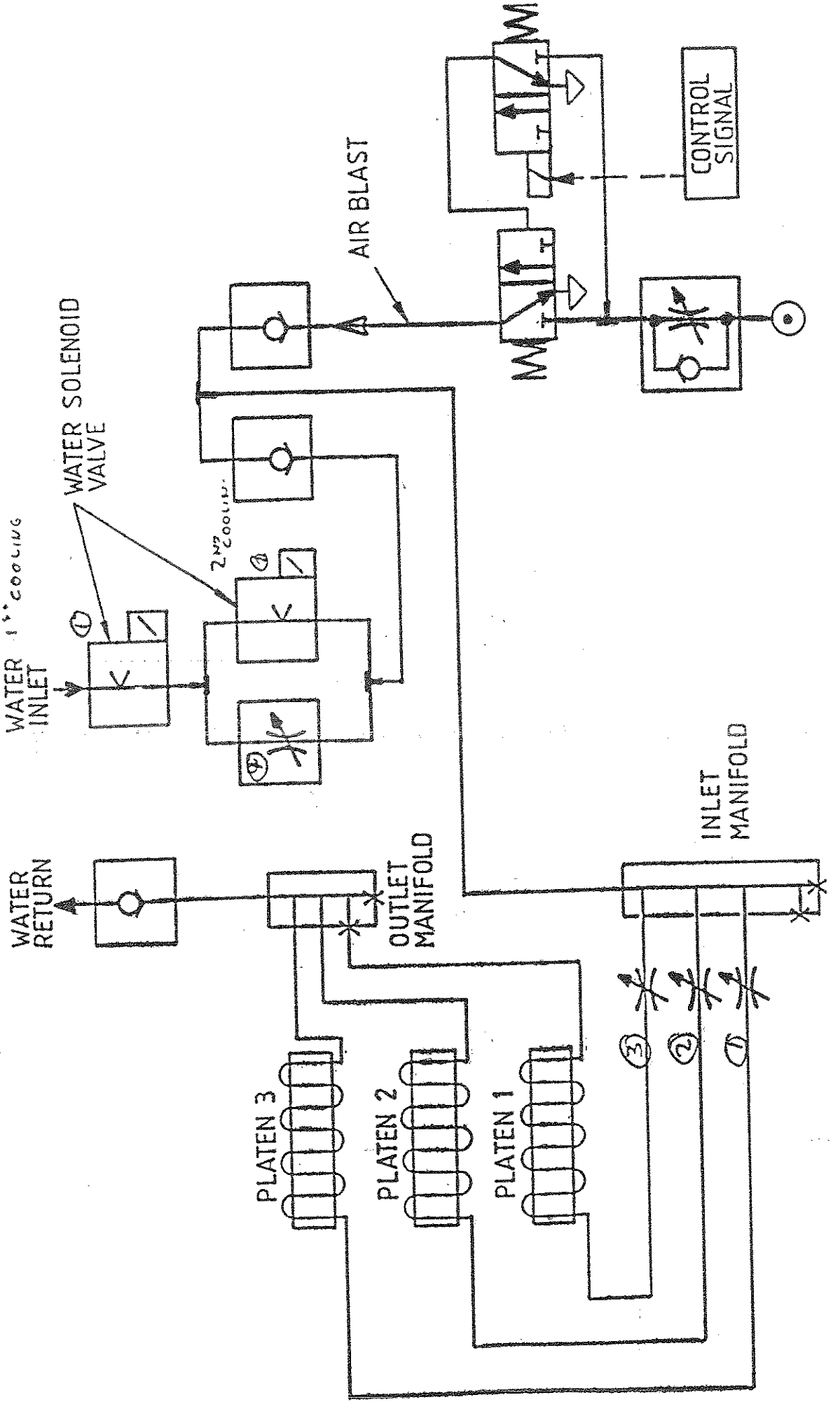
MC N ISOLATOR



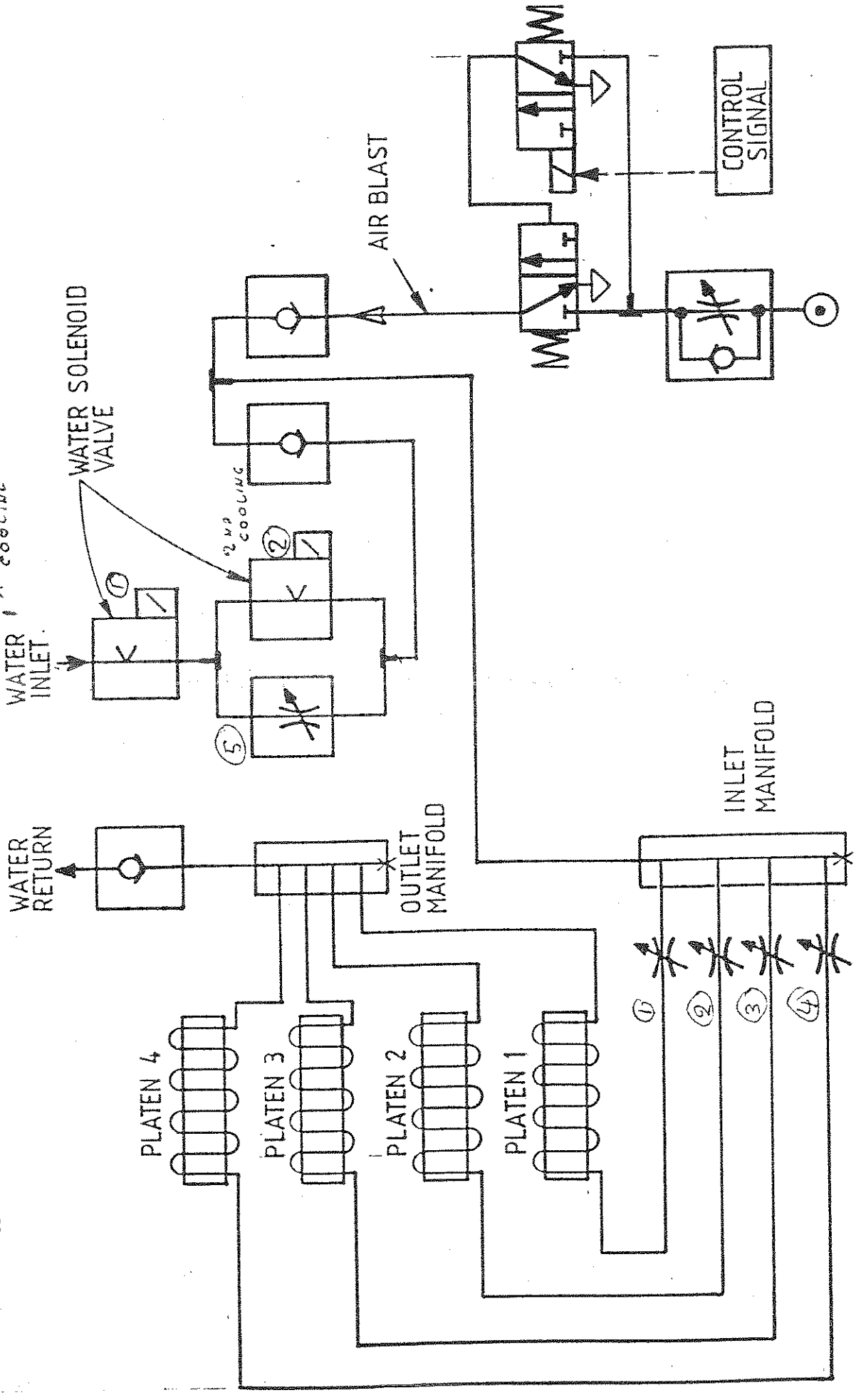
6 E/F LAMINATORS



Hydraulic Circuit Diagram 6E2 & 6E3



Water Circuit Diagram 6E2 & 6F2



Water Circuit Diagram 6E3 & 6F3

8. APPENDICES

APPENDIX B

TO SET COOLING FLOW ON LAMINATORS 6E/2 AND 6F/2

1. Disconnect air supply.

2. Fully open gate valve no. 2.

3. Open gate valves 1, 3 and 4 half a turn each.

4. Link out wires 4 and 7 and 4 and 60 - this will open both solenoid valves.

5. Set flow rate on outlet pipe to 9 litres per minute, +/- .2 litres by adjusting valves 1 and 3 an equal amount.

6. Disconnect link 4 and 60. This will close the main solenoid valve for the second cooling.

7. Adjust gate valve number 4 to give a flow rate of 1½ litres per minute, +/- .1 litre.

8. Reconnect link 4 and 60 and re-check main flow rate of 9 litres per minute and re-adjust gate valves 1 and 3 if the flow is wrong.

   Therefore, flow rates should read :

   1st cooling 1½ litres per minute, +/- .1 litre.
   2nd cooling 9 litres per minute, +/- .2 litres.

8A. Remove links 4 and 7, and 4 and 60.

9. Set time on for first cooling to 4 minutes, this is achieved by setting the timer in the electrical cabinet.

10. Load in program, (ie, LO PRESS, LAMINATE TEMP, HOLD, COOLING, HI PRESS, M/C OPEN)

11. Make up trays with material, but insert temperature probe into the centre of the pack in the middle daylight.

12. Reconnect air supply.

13. Start machine, and plot the temperature readings on the machine display and on the temperature probe display. The readings are taken every 30 seconds. Also note the time on for hold, and the time on for the first and second cooling.

14. Plot the readings on a graph.

15. The aim is to have the first cooling on the machine display to fall at the same rate as the probe display, see sample graph attached.

TO SET COOLING FLOW ON LAMINATORS 6E/3 AND 6F/3

1. Disconnect air supply.

2. Fully open gate valves 2, 3 and 5.

3. Open gate valves 1 and 4 half a turn.

4. Link out wires 4 and 7 and 4 and 60 - this will open both solenoid valves.

5. Set flow rate on outlet pipe to 9 litres per minute, +/- .2 litres by adjusting valves 1 and 4 an equal amount.

6. Disconnect link 4 and 60. This will close the main supply solenoid.

7. Adjust gate valve number 5 to give a flow rate of 1½ litres per minute, +/- .1 litre.

8. Reconnect link 4 and 60 and re-check main flow rate of 9 litres per minute.

   Therefore, flow rates should read :

   1st cooling 1½ litres per minute, +/- .1 litre.
   2nd cooling 9 litres per minute, +/- .2 litres.

8A. Remove links 4 and 7, and 4 and 60.

9. Set time on for first cooling to 4 minutes, this is achieved by setting the timer in the electrical cabinet.

10. Load in program, (ie, LO PRESS, LAMINATE TEMP, HOLD, COOLING, HI PRESS, M/C OPEN)

11. Make up trays with material, but insert temperature probe into the centre of the pack in the middle daylight.

12. Reconnect air supply.

13. Start machine, and plot the temperature readings on the machine display and on the temperature probe display. The readings are taken every 30 seconds. Also note the time on for hold, and the time on for the first and second cooling.

14. Plot the readings on a graph.

15. The aim is to have the first cooling on the machine display to fall at the same rate as the probe display, see sample graph attached.

Appendix B continued...

SAMPLE GRAPH